Picking Up and Moving an Object

EGR 445/545: Project 2

Overview

For the second group project, your team will design a gripper for your robot and add servos so that the robot that can pick up an object from a certain (x, y, z) location and move it to a specified (x, y, z) destination while avoiding an obstacle.

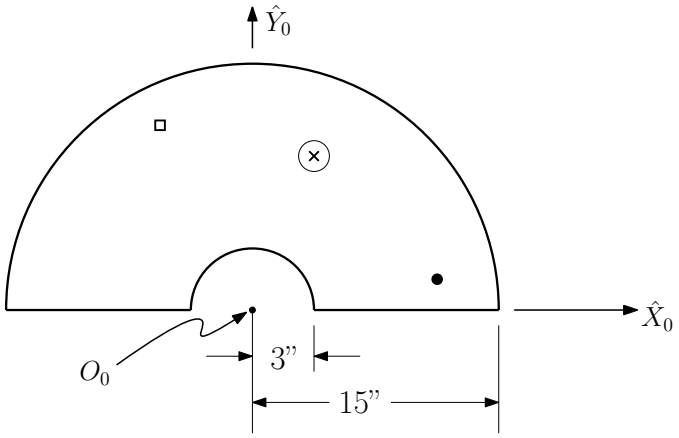


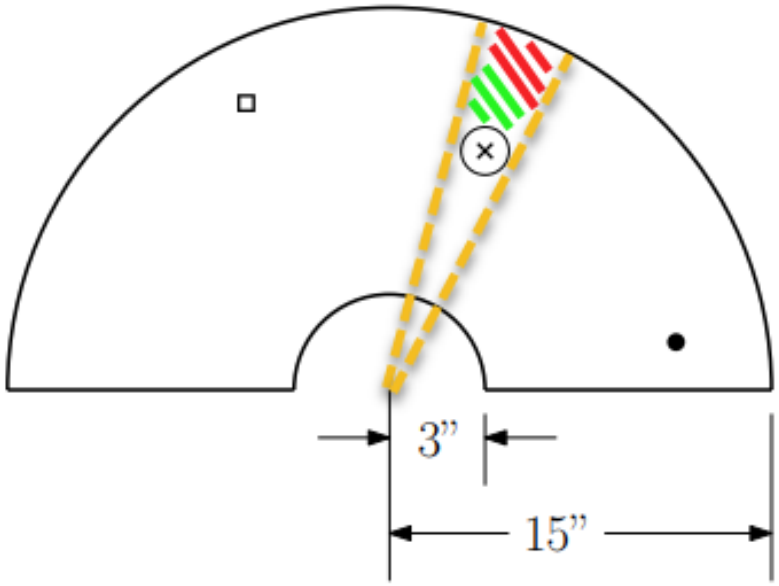
Figure 1: Schematic of the workspace, including the pick-up and drop-off locations and the obstacle.

Specifications

- Your code must take three inputs:
  1. the pick-up location
  2. the drop-off location
  3. the obstacle location
- Once the inputs are entered, the robot must perform the task in a fully automated fashion: no other inputs or human intervention are allowed.
- Your robot must be able to pick up and drop off the payload at any point in the workspace. The workspace is half of a donut shape (i.e. a cirle with a hole in the middle which is then cut in half). See Figure 1.
  - the inner radius is 3 in.
  - the outer radius is 15 in.
- The obstacle will have a maximum radius of 2 in.
- The payload will not exceed 5 ounces.

Rules Clarifications

- The servos you have been issued are the only actuators allowed.
- You are not expected to reach around the obstacle tower. Neither the pick-up nor the drop-off point will be in the area that is radially behind the the obstacle:



Grading

- inverse kinematics
- gripper design
- code
- performance
  - combination of accuracy and execution time

Demonstration Procedure

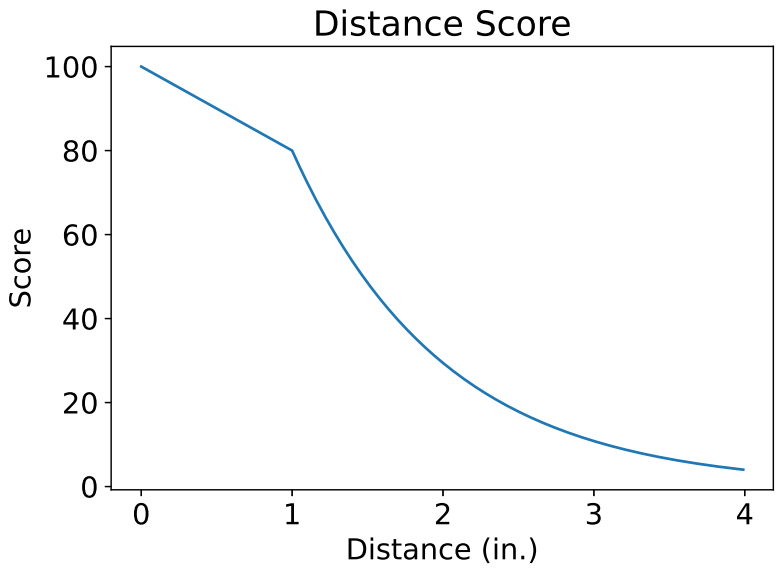
- you will be given a paper with a grid of 0.5” squares on it
- you will be given the coordinates of the pick-up and drop-off points as well as the obstacle
- the pick and drop off locations may have non-zero Z values
  - for example, you may be asked to drop off the obstacle on top of a block
- the instructor will give a count down and start a stop watch
- the stop watch will stop when your robot releases the obstacle and the obstacle comes to rest
- the bottom of the obstacle will be traced and the center will be located to establish the distance from the target

Hint

In the past, the obstacle rolling when it is released has significantly impacted the distance from the target. You are strongly encouraged to design a gripper that does not allow the obstacle to roll when released.

Performance Curves

Distance Score:



Time Score: